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BUILDING INNOVATION CAPACITIES IN LOW AND MEDIUM-TECH SMES

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The article covers the following questions: how to define competence related to innovation activities that should be improved; how to spot future competence needs; how to structure training programme to ensure effective delivery; how to define the content of SMEs training programme as their needs and abilities vary significantly. Literature review shows that there is no clear-cut answer to those questions.

Small and medium enterprises in low and medium-tech sectors form economic backbone of developed countries – most of employment and gross domestic product is associated with SMEs. The innovation research, practitioners and SME policy measures tended to focus on high-tech, high absorptive capacity SMEs, however this group of SMEs constitutes only small proportion of total SME population. Innovations in most SMEs and especially in low and medium-tech sectors, however, take place through ad hoc or project driven activities rather than formally organised activities. Enhancing innovation performance of the mainstream low and medium-tech SMEs is challenging, yet promising opportunity.

SMEs are much focused on their missions and targets and they do not always have the sufficient attention for long-term research and innovation objectives. Usually companies assess new business opportunities in terms of investment and return on investment; quite naturally they transfer this thinking to R&D and innovation. But there's inherent complexity and uncertainty dealing with long term research, it's difficult to put hard figures or have fixed plans. And hence there's little trust in such endeavours and natural tendency towards short sighted R&D and incremental innovation. Strategic R&D requires new competencies. Long duration associated with risks and long term commitments, complexity of ideas, relationships, projects, maintaining cross-functional cross-organizational teams. It is difficult for an SME to assess the value of future business and new knowledge.

The strengths of most SMEs are in their agility and customer knowledge. Understanding innovation activities, enhancing their ability to leverage these strengths in delivering new significant value are the key to sustainable growth of SMEs. Few SMEs can capture value from innovation alone; most have to rely on outside sources for ideas, technologies and knowledge. In order to get a valuable input from outside, SMEs need to go through the difficult process of searching the environment, identifying a 'matching' competence and combine it with their internal capabilities. Ability to exploit external knowledge to their advantage referred to as absorptive capacity, capability to collaborate effectively depends on internal processes, structures and individual competencies.

From a practitioners' point of view here are two key questions:

1) How to know what innovation related competences should be strengthened?
2) What learning path is most effective?

The competence can be defined as the capability to perform the jobs activities in a given professional context, in order to answer organisational requirements thus, to be effective, the content of innovation training should take into account the context, current and future competence needs of a particular company. On the other hand, the delivery of innovation training should have a practical component.

Introduction

SMEs' strengths even in low and medium-tech sectors lie in their agility, imagination and customer interaction. However many SMEs face significant barriers from within and outside that prevent using these potential strengths. Practitioners, academics and policy makers on the issues of technology and innovation have had traditionally a focus on cutting-edge, high-tech SMEs or SMEs of high absorptive capacity. However, in the best-case scenario, the SMEs in this group do not exceed the 10% of the total population. To have significant impact, policy measures should reach large proportion of SMEs and be tailored to various types of SMEs and their particular needs.

From the practitioner's viewpoint, the above considerations have certain implications on how knowledge transfer or innovation competence programme targeted to SMEs should be structured and delivered. To be effective at least it should take into account current absorptive capacity of particular SME, its context and innovation needs.

The aim of research – to propose a scheme for innovation training programme development for low and medium-tech SMEs. The objective of this research – to review relationship of absorptive capacity with innovation activities; competences and absorptive capacity; to analyze practical issues in developing and deployment of innovation programmes in low absorption capacity SMEs. The methods of the research are systematic, logic and comparable analysis.

SMEs and innovation

Business innovation within small and medium sized firms is a fusion of technology adoption, various internal activities and intensive marketing. In a highly cited article written by Sawhney et al (2006), business innovation is defined as "the creation of substantial new value for customers and the firm by creatively changing one or more dimensions of the business system". They recognize four key innovation dimensions:

- offerings (products/services);
- processes;
- customers;
- points of presence in the market (distribution).

A company needs to perform in all four dimensions in order to survive in the long term. Small firms target niche markets rather than mass markets. In fact, established small firms (beyond the start-up phase) are usually very good in managing the market side of their innovation activities, i.e. customers and points of presence. In simple terms, SMEs manage relatively well the interface with the market in the sense of understanding well the needs, the requirements and the purchasing ability of their customers. Where most of the SMEs are relatively weaker, is on the other 'side' of innovation namely the development of new products and processes. More specifically, although the smaller firms are good at generating new ideas (or 'sensing' new ideas from the market), they are facing significant barriers in realizing the development of new products or new processes.

SMEs and absorptive capacity

Collaboration is critical for SMEs innovation activity (Freeman, 1991). For the majority of SMEs the only way to develop new processes, services or products, new business models is through accessing external sources of expertise such as scientific, technical and professional experts (Tyson, 1993), university departments (Chrisman and Katrishen, 1995), consultants and other intermediary organizations (Bessant and Rush, 1995). They have to adopt technology or knowledge from outside and fuse it with their internal activities, a task that a lot of SMEs underperform. There are a number of reasons for this. In order to get a valuable input from outside, SMEs need to go through the difficult process of searching the environment, identifying a "matching" competence and combine it with their internal capabilities. However most of the small companies tend to focus on a limited range of products and services (Hemer, 1995) making the "matching" process difficult. To complicate things further, innovations in small firms take place through ad hoc or project driven activities rather than formally organised activities (Dodgson and Rothwell, 1990); as a result SMEs do not always posses the capability to identify the right source of expertise and organize the transfer of its knowledge to the company. It has become clear that different SMEs have different levels of capacity to identify, negotiate with and absorb knowledge from external sources of expertise.

In the enterprise context, absorptive capacity refers to a firm's ability to identify, assimilate and exploit knowledge from external sources (Cohen & Levinthal, 1990, Lane & Lubatkin, 1998; Van den Bosch et al., 1999; Zahra & George, 2000).

Four dimensions of absorptive capacity are recognized:

- acquisition referring to "a firm's capability to identify and acquire externally generated knowledge that is critical to its operations";
- assimilation "the firm's routines and processes that allow it to analyze, process, interpret and understand the information obtained from external sources";
- transformation denoting the capability of the firm to combine "existing [internal] knowledge with newly acquired and assimilated knowledge";
- exploitation "the firm's ability to harvest and incorporate knowledge into its operations".

With regards to absorbtion capacity, research made at University Brighton (UK), distinguishes three groups of SMEs:

- ***Cutting-edge SMEs.*** These are the SMEs that perform cutting-edge innovative activities developing new technologies. This group involves for instance firms in high-technology or science-based sectors and in several cases they spin-off from the commercialization of university research. These companies have exceptionally high absorptive capacity engaging in intensive knowledge transfer activities. They have a sound understanding of the technological aspects underpinning their products and process – but may lack understanding of markets and customers. They are very important for the economic development but they are a very small minority of the total population of SMEs. The size of this group do not exceed 3 % of total SME population.
- ***High absorptive capacity SMEs.*** This group leads the use or adoption of new technologies. These are the companies that innovate by developing, combining or actively adapting existing technologies. They have a sound understanding of their markets and customers but have a less clear understanding of the technological aspects underpinning their products and process. They have nurtured their absorptive capacity over years of practice and they have managed to place themesleves in networks with good sources of expertise. The size of

this group does not exceed the 15 % of all SMEs (taking into account the 10 % of leading technology users and the top 5 % of the technology adopters).

- ***Low absorptive capacity SMEs.*** These SMEs can be defined as those who can engage in innovation only if they see clear value in doing so. They are those companies which can exploit technologies through adaptation – but they don't always do it. They have a sound understanding of their markets and customers but have very limited understanding of the technological aspects underpinning their products and processes and they clearly underperform in knowledge and technology transfer acivities. Their share in the total population exceeds the 80 %.

This classification corresponds to that developed by Working Group EURAB (2004) 12 which distinguishes SMEs according to the degree they can develop, reconfigure or adapt new technologies – technology pioneers, leading technology users, technology adopters and basic SMEs with little or no R&D.

There is also clear relationship between absorptive capacity and learning (Barkema & Vermeulen, 1998; 15 Ahuja & Katila, 2001; 16, Simonin 17, 1999), and organizational learning factors that explain the development of absorptive capacity in particular knowledge domains (Barkema & Vermeulen, 1998; Rosenkopf & Nerkar, 2001 18). Underlying many of the papers in this theme is the assumption that learning and absorptive capacity co-evolve with each influencing the other. The feedback loop (absorptive capacity → learning → new absorptive capacity) is mediated by the environment in which the firm competes and its success in coping with it. Consequently, this strategically valuable capability is a path dependent, firm-specific, and socially embedded means to use other firms' knowledge to create competitive advantage. It is also dependant on internal knowledge sharing and integration (Zahra and George, 2000).

Innovation training programme development process for low absorption capacity SMEs

A group of SMEs volunteered to participate in piloting new approach to innovation training. The participant companies represent low and low-medium tech companies, including service providers, covering wood and furniture, electronics & IT, materials and construction sectors. One uniting feature is awareness of the need to develop strategic resources – competences that will meet current and future development and innovation needs. Initial assessment showed that companies have challenges in different areas – resources, organisation and strategy. Important aspect for many companies is the access to networks (fig. 1).

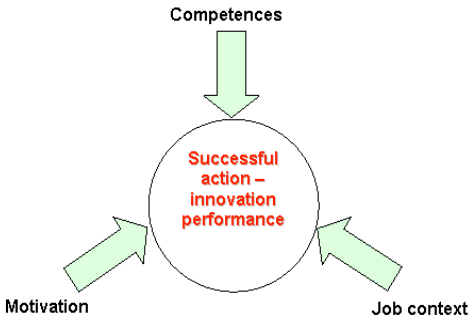

Fig. 1. Performance determinants

Source: proposed by authors.

There are several challenges in the process of training programme development:

- the context as well as strategies and organisation of companies vary. Organisational readiness – involves enterprise-wide understanding of what the company is trying to achieve and the reasons why, as well as relevant resources. The learning objectives should reflect that;

- on the resource side, innovation capacity depends on individual performance resulting on competencies, job context and motivation. Thus, a learning path should be individually designed for each organisation;

- knowledge transfer in SMEs is meaningful only when it is thoroughly connected to the innovation activities taking place within a smaller business. It is more about "learning" than "teaching";

- training should be related to business development.

Innovation activities in SMEs may have many forms – they may be technology related, include, product and process development and marketing. Activity which delivers new value to customers and the firm by changing one or more dimensions of the business system, namely – offerings, processes, customers, and points of presence in the market Non-technological aspects of innovation in this context are at least as important as new technology.

It means that training programme should be customised to each participant company's need. On the other hand, it should follow clear logical frame in the process of adaptation.

We propose a methodology for adaptation of innovation training programmes targeted at SMEs summarised in the figure 2 below.

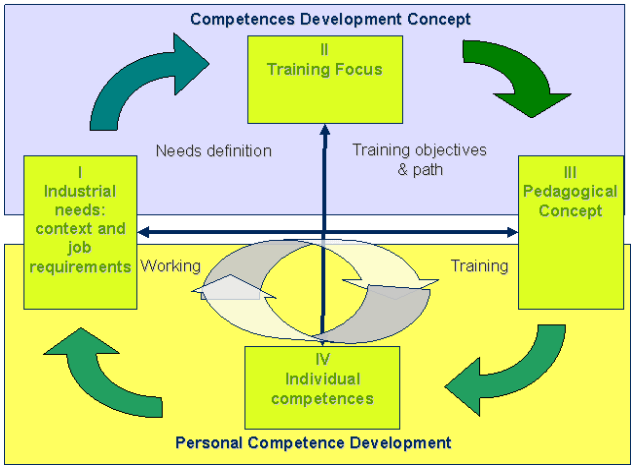

Fig. 2. Innovation training programme development and deployment

Source: proposed by authors.

The approach to training and coaching covers definition phase, where the "big picture" of business innovation is introduced and specific situation of the participant company is related to the framework concepts of business innovation dimensions and current and future business needs are captured; competences required to meet those needs assessed.

The case identification and design phase which addresses particularly important innovation issue or competence gap.

Implementation phase when acquired competences, designed approaches or processes are embedded into company structures. Further competencies enhanced through work practice.

Thus we can deliver a demand-pulled and context-specific training/coaching. To really empower the SMEs for long-term success, the cases are transformed to a reference case, which can be reused, transferred to other personnel or modified according to the needs.

It might look like tedious task, however there are no short cuts to efforts to build systems that develop the full potential of existing employees and cultures which provide the collaboration, mentoring, and learning opportunities that help everyone do better may initially seem surprising, that is only because we have succumbed to the idea that how people perform depends on some stable individual characteristics like talent or innate ability rather than where they work, the technology and systems available to them, the quality of their colleagues, and the ability of their leaders.

The covered training and coaching themes follow key innovation areas: creativity, strategy, organisation, innovation life cycle management, and innovation culture. Important success factors include involvement of key decision makers within the companies and ability to define training/coaching results that have a meaning to the company.

Conclusions

Reaching out to majority of SMEs rather than focusing on high-tech, cutting edge SMEs is challenging task from innovation policy perspective and for practitioner who stands up to "upgrade" innovation capacity of low absorption capacity SME. The challenge is in that every SME has unique innovation competency needs, skills and knowledge that define an organisation's competitive edge.

Definition of competency needs, especially if they are oriented towards the future requires alignment with the company's strategy. Innovation training programme developing process should take into account following:

- flexibility to accomodate different needs through modular or "tool-box" approach;
- company participation in clarifying and focusing training needs;
- allignment company dvelopment and training needs;
- focusing on innovation-in-practice rather than discipline of innovation.

Proposed innovation training programme development model includes four stages: needs definition, training concept, training and application stages.

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